

We claim :

1. A reactor for containing a solid catalyst for a heterogeneous gas-phase reaction into which reactor there extends at least one inlet pipe for a molecular oxygen-containing gas, in which, said inlet pipe has means for surrounding a substantial portion of said pipe in said reactor with an inert fluid.
2. A reactor as claimed in claim 1 in which at least 85 % of the said pipe in said reactor is surrounded by said surround means.
3. A reactor as claimed in claim 1 in which said inert fluid comprises an inert gas.
4. A reactor as claimed in claim 3 in which said inert gas is selected from the group consisting of nitrogen, carbon dioxide, helium, argon, neon, krypton and mixtures thereof.
5. A reactor as claimed in claim 1 in which said means for surrounding a substantial portion of said inlet pipe in said reactor with inert fluid comprises an outer pipe surrounding a substantial portion of one or more inlet pipes for molecular oxygen containing gas in said reactor and provided with a supply of inert fluid.
6. A reactor as claimed in claim 5 which further comprises means for allowing for differential expansion of said inlet pipe and said means for surrounding said pipe with inert fluid.
7. A reactor as claimed in claim 1 which further comprises means for detecting a change in pressure of said inert fluid surrounding said inlet pipe.
8. A reactor as claimed in claim 1 which further comprises means for detecting the presence of inert fluid in gaseous effluent from said reactor.
9. A reactor as claimed in claim 1 which further comprises means for detecting

~~molecular oxygen-containing gas in said inert fluid surrounding said inlet pipe.~~

10. A reactor as claimed in claim 1 in which said inlet pipe further has means for suppressing ingress to the inlet pipe from the reactor of flame, reagents, products, catalyst or combinations thereof. —

5 11. A reactor as claimed in claim 10 in which said ingress suppression means comprises means for providing molecular oxygen-containing gas in said inlet pipe at a higher pressure than the pressure in said reactor.

12. A reactor as claimed in claim 10 in which said ingress suppression means comprises a restriction to the outlet of said inlet pipe.

10 13. A reactor as claimed in claim 12 in which said restriction comprises one or more orifices.

14. A reactor as claimed in claim 12 in which said restriction is located at a distance from the outlet of said inlet pipe in the reactor such that a potential detonation is avoided.

15 15. A reactor as claimed in claim 12 in which said restriction is located 4 to 5 pipe diameters from the end of the inlet pipe.

16. A reactor as claimed in claim 12 in which said restriction is located within the region of said inlet pipe surrounded by said means for surrounding said inlet pipe with inert fluid.

17. A reactor as claimed in claim 1 having more than one inlet pipe.

18. A reactor as claimed in claim 18 in which the distance between inlets is significantly in excess of the potential flame length.

19. A reactor as claimed in claim 17 in which said molecular oxygen-containing gas for said inlet pipes is provided from a common end box having a low inventory and optionally provided with a safety purge during shut-down.

25 20. A reactor as claimed in claim 1 in which said inlet pipe is adapted to be operably connected to a supply of molecular oxygen-containing gas provided through one or more flow restriction means which restrict the flow of molecular oxygen-containing gas to the inlet pipe.

21. A reactor as claimed in claim 1 in which the reactor is a fluid bed reactor.

30 22. The use of a reactor as claimed in claim 1 in a process selected from the group consisting of the acetoxylation of olefins, the reaction of ethylene, acetic acid and oxygen

to produce vinyl acetate, the oxidation of ethylene to acetic acid, the oxidation of ethane to ethylene and/or acetic acid, the ammoxidation of propylene, propane or mixtures thereof to acrylonitrile and the oxidation of C4's to maleic anhydride.

23. A process in which a molecular oxygen-containing gas is introduced into a reactor  
5 containing a solid catalyst for a heterogeneous gas-phase reaction in which said molecular oxygen-containing gas is introduced into said reactor through at least one inlet pipe extending into said reactor, said inlet pipe having means which surrounds a substantial portion of said pipe in said reactor with an inert fluid.

24 A process as claimed in claim 23 in which at least 85 % of the said pipe in said  
10 reactor is surrounded with said inert fluid.

25. A process as claimed in claim 23 in which said inert fluid comprises an inert gas.

26. A process as claimed in claim 25 in which said inert gas is selected from the group consisting of nitrogen, carbon dioxide, helium, argon, neon, krypton and mixtures thereof.

27. A process as claimed in claim 23 in which said reactor comprises a reactor as claimed in claim 5.

28. A process as claimed in claim 23 in which said reactor comprises a reactor as claimed in claim 6.

29. A process as claimed in claim 23 in which said reactor comprises a reactor as  
20 claimed in claim 7.

30. A process as claimed in claim 23 in which said reactor comprises a reactor as claimed in claim 8.

31. A process as claimed in claim 23 in which said reactor comprises a reactor as claimed in claim 9.

25 32. A process as claimed in claim 23 in which there is a difference in pressure between the inert fluid substantially surrounding the inlet pipe and the molecular oxygen-containing gas in the range 1 kPa to 10 MPa.

33. A process as claimed in claim 32 in which the inert fluid is at a pressure greater than the pressure of the molecular oxygen-containing gas.

34. A process as claimed in claim 23 in which said reactor comprises a reactor as claimed in claim 10.

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35. A process as claimed in claim 23 in which said reactor comprises a reactor as claimed in claim 11.

36. A process as claimed in claim 23 in which said reactor comprises a reactor as claimed in claim 12.

37. A process as claimed in claim 23 in which said reactor comprises a reactor as claimed in claim 13.

38. A process as claimed in claim 23 in which said reactor comprises a reactor as claimed in claim 14.

39. A process as claimed in claim 23 in which said reactor comprises a reactor as claimed in claim 15.

40. A process as claimed in claim 23 in which said reactor comprises a reactor as claimed in claim 16.

41. A process as claimed in claim 23 in which said reactor comprises a reactor as claimed in claim 17.

42. A process as claimed in claim 23 in which said reactor comprises a reactor as claimed in claim 18.

43. A process as claimed in claim 23 in which said molecular oxygen-containing gas is provided from a common end box having a low inventory and optionally provided with a safety purge during shut-down.

44. A process as claimed in claim 23 in which said molecular oxygen-containing gas is provided through one or more flow restriction means which restrict the flow of molecular oxygen-containing gas to the inlet pipe.

45. A process as claimed in claim 23 in which the reactor is a fluid bed reactor.

46. A process as claimed in claim 23 which comprises a process selected from the group consisting of the acetoxylation of olefins, the reaction of ethylene, acetic acid and oxygen to produce vinyl acetate, the oxidation of ethylene to acetic acid, the oxidation of ethane to ethylene and/or acetic acid, the ammoxidation of propylene, propane or mixtures thereof to acrylonitrile and the oxidation of C4's to maleic anhydride.